Combined Plan Curriculum Guide - College of the Holy Cross

<u>2021-22 PRE-COMBINED PLAN CURRICULUM GUIDE FOR HOLY CROSS STUDENTS</u>

FOUNDATION COURSES REQUIRED OF ALL MAJORS:

i. MATHEMATICS
- The full sequence of Calculus (MATH 135, MATH 136, and MATH 241, or equivalent).

ii. PHYSICS
- Mechanics and Thermodynamics (PHYS 115)
- Electricity, Magnetism, and Optics (PHYS 116)

iii. CHEMISTRY
- General Chemistry I (CHEM 181)

iv. LABORATORY REQUIREMENT
Either one-semester physics lab or one-semester chemistry lab is generally required. Please see individual programs below for more details.

v. COMPUTER SCIENCE
- Introduction to computer science and programming in C++, JAVA, Python or MATLAB
Note that some majors require a specific programming language (see requirements for majors below).

vi. HUMANITIES AND SOCIAL SCIENCES
- Twenty-seven credit hours non-technical requirement is satisfied by the course work taken for the bachelor's degree awarded by the home institution. Among these courses the students must include:
    a. Principles of Economics (ECON 100 or 110)
    b. English Composition (ENGL 100 or check with the 3-2 Program Advisor for an appropriate course).

Additional courses are required for certain majors. See the list below for additional requirements by major.

REQUIRED MAJOR SPECIFIC COURSES

Additional, major-specific, requirements are bulleted. Courses that are underlined are not available at Holy Cross but may be available at Consortium schools. In some instances where noted, it may be possible to take these courses the summer prior to registering at Columbia or while enrolled at Columbia.

APPLIED MATHEMATICS or APPLIED PHYSICS

MATHEMATICS
- Ordinary Differential Equations (MATH 304)

PHYSICS
- Classical and Quantum Waves (PHYS 223)
- Physics Lab (taken with PHYS 115)

COMPUTER SCIENCE
- Introduction to Computer Programming (CSCI 131)

CHEMISTRY / BIOLOGY (Choose one of the following three)
- General Chemistry I (CHEM 181)
- Environmental Biology: Molecules to Cells (consortium course)
- Introduction to Molecular and Cellular Biology (BIOL 161)

BIOMEDICAL ENGINEERING

MATHEMATICS
- Introduction to Applied Mathematics (PHYS 221)
         -or-
  Ordinary Differential Equations (MATH 304) and Linear Algebra (MATH 244)

PHYSICS
- Classical and Quantum Waves (PHYS 223)

CHEMISTRY
- General Chemistry II and Lab (CHEM 231)

BIOLOGY
- Introduction to Biology I (BIOL 161)
- Introduction to Biology II (BIOL 162)

COMPUTER SCIENCE
- Computer Programming in Python

ELECTRICAL ENGINEERING
- Introduction to Electrical Engineering [may be taken before or during enrollment at Columbia]

CHEMICAL ENGINEERING

MATHEMATICS
- Introduction to Applied Mathematics (PHYS 221)
        -or-
  Ordinary Differential Equations (MATH 304) <u>and</u> Linear Algebra (MATH 244)

PHYSICS
- Physics Lab (taken with PHYS 115)

CHEMISTRY
- General Chemistry II and Lab (CHEM 231)
- Organic Chemistry I and Lab (CHEM 221) [may be taken before or during enrollment at Columbia]
- Organic Chemistry II and Lab (CHEM 222) [may be taken before or during enrollment at Columbia]

COMPUTER SCIENCE
- Computer Programming in Python

CIVIL ENGINEERING

MATHEMATICS
- Introduction to Applied Mathematics (PHYS 221)
        -or-
  Ordinary Differential Equations (MATH 304) <u>and</u> Linear Algebra (MATH 244)

GEOLOGY
- Earth: Origin, Evolution, Processes and Future (GEOS 150)

COMPUTER SCIENCE
- Introduction to Computer Science and Programming (CSCI 131)
  (Programming in Python preferred but will accept any language)

ENGINEERING MECHANICS
- <u>Mechanics</u> [may be taken before or during enrollment at Columbia]

COMPUTER ENGINEERING

MATHEMATICS
- Introduction to Applied Mathematics (PHYS 221)
        -or-
  Ordinary Differential Equations (MATH 304) <u>and</u> Linear Algebra (MATH 244).

COMPUTER SCIENCE
- Introduction to Computer Science and Programming (CSCI 131)
- Discrete Mathematics (CSCI 135 or MATH 243)

ELECTRICAL ENGINEERING
- <u>Introduction to Electrical Engineering</u> [may be taken before or during enrollment at Columbia]

COMPUTER SCIENCE

COMPUTER SCIENCE
- Introduction to Computer Science and Programming (CSCI 131)
- Discrete Mathematics (CSCI 135 or MATH 243)
- Data Structures (CSCI 132)

EARTH AND ENVIRONMENTAL ENGINEERING

MATHEMATICS
- Introduction to Applied Mathematics (PHYS 221)
      -or-
  Ordinary Differential Equations (MATH 304) <u>and</u> Linear Algebra (MATH 244).
- <u>Introduction to Probability and Statistics</u> [may be taken before or during enrollment at Columbia]

CHEMISTRY
- General Chemistry II and Lab (CHEM 231)

COMPUTER SCIENCE
- Introduction to Computer Science and Programming (CSCI 131)

EARTH AND ENVRIONMENTAL SCIENCES
- <u>A Better Planet By Design</u> [may be taken before or during enrollment at Columbia.]

OTHER SCIENCE ELECTIVE (choose one of the following three)
- Organic Chemistry (CHEM 221)
- Classical & quantum waves (PHYS 223)
- Introduction to Molecular and Cellular Biology (BIOL 161)

EARTH AND ENVIRONMENTAL SCIENCES (choose one of the following two)
- <u>Earth's Environmental Systems: The Climate System</u> [may be taken while at Columbia.]
- <u>Earth's Environmental Systems: The Solid Earth System</u> [may be taken while at Columbia.]

ENGINEERING MECHANICS

MATHEMATICS
- Introduction to Applied Mathematics (PHYS 221)
    -or-
  Ordinary Differential Equations (MATH 304) <u>and</u> Linear Algebra (MATH 244).
- <u>Introduction to Probability and Statistics</u> [may be taken before or during enrollment at Columbia]

COMPUTER SCIENCE
- Introduction to Computer Science and Programming (CSCI 131)

ENGINEERING MECHANICS
- <u>Mechanics</u> [may be before or during enrollment at Columbia]

ELECTRICAL ENGINEERING

MATHEMATICS
- Introduction to Applied Mathematics (PHYS 221)
    -or-
  Ordinary Differential Equations (MATH 304) <u>and</u> Linear Algebra (MATH 244).

PHYSICS
- Classical and Quantum Waves (PHYS 223)

COMPUTER SCIENCE
- Introduction to Computer Science and Programming (CSCI 131)

ELECTRICAL ENGINEERING
- <u>Introduction to Electrical Engineering</u> [may be before or during enrollment at Columbia]

IEOR: INDUSTRIAL ENGINEERING, ENGINEERING MANAGEMENT SYSTEMS, or OPERATIONS RESEARCH

MATHEMATICS (Choose one of the following two)
- Linear Algebra (MATH 244)
- Ordinary Differential Equations (MATH 301)

PROBABILITY AND STATISTICS (Choose one of the following two)
- Probability Theory (MATH 375)
- Statistical Inference (MATH 376)

COMPUTER SCIENCE
- Introduction to Computer Programming (CSCI 131)
- Data Structures (CSCI 132)

MATERIALS SCIENCE AND ENGINEERING

MATHEMATICS
- Introduction to Applied Mathematics (PHYS 221)
        -or-
- Ordinary Differential Equations (MATH 304) <u>and</u> Linear Algebra (MATH 244)

PHYSICS
- Physics Lab (taken with PHYS 115)
- Classical and Quantum Waves (PHYS 223)

COMPUTER SCIENCE
- Computer programming in Python

MECHANICAL ENGINEERING

MATHEMATICS
- Introduction to Applied Mathematics (PHYS 221)
        -or-
  Ordinary Differential Equations (MATH 304) <u>and</u> Linear Algebra (MATH 244).

PHYSICS/ BIOLOGY (choose one of the following three)
- Classical and Quantum Waves (PHYS 223)
- Environmental Biology: Molecules to Cells (consortium course)
- Introduction to Molecular and Cellular Biology (BIOL 161)

COMPUTER SCIENCE
- Introduction to Computer Science and Programming (CSCI 131)
- <u>Foundations of Data Science</u> [may be taken before or during enrollment at Columbia]

ENGINEERING MECHANICS
- <u>Mechanics</u> [may be taken before or during enrollment at Columbia]

ELECTRICAL ENGINEERING
- <u>Intro. to Electrical Engineering</u> [may be taken before or during enrollment at Columbia]